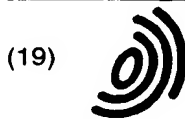


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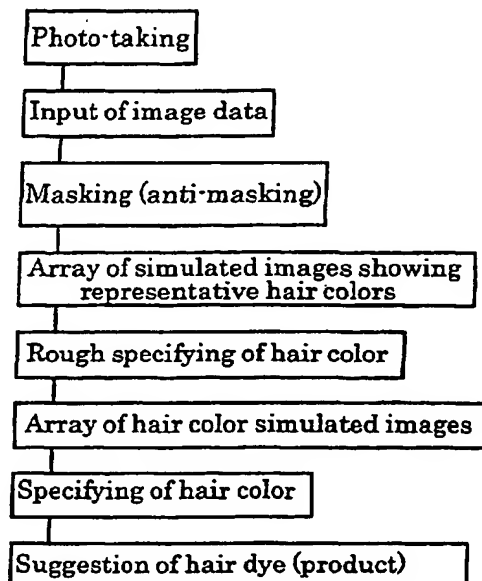
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(54) **HAIR COLOR ADVICE SYSTEM**

(57) An object of the present invention is to build a simulated image in which a subject's hair is changed to a desired color, and to accurately suggest the hair dye needed to dye the subject's hair from its existing color to the desired color. To achieve this object, the hair color advice system according to the present invention comprises (i) an image memory means into which image data regarding the subject is input and stored, (ii) a processing means that finds the hair area in the input image of the subject and builds a simulated image in which the color of the hair area is changed to any color, and (iii) a monitor on which the input image of the subject and/or the simulated image are displayed.

Fig. 1



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## Description

### TECHNICAL FIELD

[0001] The present invention relates to a method and system by which color of hair is simulated on the hair area of a subject over an image of the subject in order to find what color the subject desires, and identify the hair dye needed to obtain the color.

### BACKGROUND ART

[0002] Hair dyes and bleach are used to make gray hairs less conspicuous or to dye hair a desired color as a dressing up means. Hair dyes include temporary dyes (color shampoo, color conditioner, color treatment conditioner, etc.) that are easy to apply but the dyed hair retain the color for a short time, semi-permanent dyes (hair manicure, clear-type hair manicure, etc.) that provide a dye effect that can be continuously maintained through penetration of an acidic dye into the interior of the hair, and permanent dyes that achieve an essentially permanent dye effect through oxidation polymerization of the dye in the interior of the hair, and a particular type of hair dye is selected depending on the intended use.

[0003] Each of these types of dyes is prepared in numerous color numbers, and each color of dyes is shown by means of printing on the box containing the dye, or by means of sample tresses of dyed hair.

[0004] Incidentally, the color of the hair after dyeing is not determined solely by the inherent color of the dye, but affected by the color of the hair before it is dyed. Therefore, even where the same color dye is used, the color of the hair after dyeing differs considerably depending on whether the hair is black, brown or gray before dyeing. In addition, where the same color dye is used, the hair color after dyeing also differs depending on whether the hair is being dyed for the first time using the dye, or whether the hair is being dyed again after the color from a previous dyeing has faded.

[0005] Consequently, it is difficult to predict the color that will result from dyeing any person's hair solely from the printing on the box or the sample tresses, and the problem arises that the actual color of the hair after dyeing is different from the color anticipated.

[0006] Furthermore, hair dyeing not only changes the color of the hair, but significantly affects the overall appearance of the person whose hair is being dyed. Moreover, it is even more difficult to predict the person's overall appearance after the hair is dyed than it is to predict the color of the person's hair after dyed. As a result, even where the hair color itself turns out as expected, the person may still be displeased with their overall appearance after the dyeing is performed.

### DISCLOSURE OF THE INVENTION

[0007] An object of the present invention is to accurately suggest the appropriate hair dye to change a person's hair color to the desired color, and to confirm the person's overall appearance after the hair was dyed into the desired color.

5 [0008] The inventors have discovered that, in order to attain this object, it is effective to (1) input the image of the subject (a person) into a memory means of a computer, simulate on a monitor (display screen) the hair color on only the hair area of the input image, and show

10 the simulated image to the subject so that the subject may confirm his or her overall appearance after dyeing, as well as to (2) output the name of the hair dye needed to dye the subject's hair into the same color as the hair color of the simulated image, based on a database that describes references between hair dyes and hair colors before and after dyeing therewith.

15 [0009] The present invention provides a hair color advice system comprising (i) an image memory means into which image data regarding the subject is input and stored, (ii) a processing means that finds the hair area in the input image of the subject and builds a simulated image in which the color of the hair area is changed to any color, and (iii) a monitor (display screen) on which the input image of the subject and/or the simulated image are displayed.

20 [0010] The present invention also provides a hair color advice method comprising (i) a step in which the image data of the subject is input to the image memory means, (ii) a step in which the processing means finds the hair area in the input image of the subject and builds a simulated image in which the color of the hair area is changed to any color, and (iii) a step in which the input image of the subject and/or the simulated image are displayed on the monitor (display screen).

25 [0011] In the present invention, the hair dye includes (i) permanent dyes, (ii) semi-permanent dyes such as hair manicures, (iii) temporary dyes such as hair foams, shampoos, conditioners, treatment conditioners, etc. containing coloring agents, and (iv) bleaches, and the hair dyeing includes (i) changing the hair color by means of a hair dye and (ii) bleaching the color of the hair by means of a bleaching agent.

### BRIEF DESCRIPTION OF THE DRAWINGS

#### [0012]

Fig. 1 is a flow chart of the hair color advice method of the present invention;

Fig. 2 is a system construction diagram of the hair color advice system of the present invention;

Fig. 3 is a display screen showing the subject image input into a personal computer;

Fig. 4 is a drawing to explain masking;

Fig. 5 is a display screen showing an array of simulated images;

Fig. 6 is a display screen showing a simulated image of a specified hair color; and

Fig. 7 is a display screen showing a hair dye suggested.

## BEST MODE FOR CARRYING OUT THE INVENTION

**[0013]** Fig. 1 is a flow chart showing one embodiment of the hair color advice method pertaining to the present invention. Fig. 2 shows an example of the construction of the system that provides this hair color advice method, and includes a personal computer 1 that serves as a memory means into which image data regarding the subject is input and stored and as a processing means that finds the hair area of the subject in the input image and simulates an image with a hair color. Connected to the personal computer 1 are, as an image reading means, a digital still camera 2 that takes a photograph of the subject, an image scanner 3 that reads image data from the photograph of the subject, and a device that can read image data over telecommunications network such as the Internet. A monitor (display screen) 4 and a printer 5 are also connected to the personal computer 1, and are used to show the subject's image data stored in the personal computer 1, as well as associated simulated image data, as required.

**[0014]** In the hair color advice method pertaining to the present invention, first, the subject's image data is input into the personal computer 1 that serves as an image memory means. More specifically, a photograph of the subject is taken of using the digital still camera 2, and this image data is input into and stored in as an image file in the personal computer 1. Alternatively, image data may be taken from the photograph of the subject and input into the personal computer 1 by means of the image scanner 3, or subject's image data previously stored on a desired storage medium may be input into the personal computer 1. It is also acceptable if a face image of the subject is read over telecommunications network such as the Internet and this image data is input into the personal computer 1. The method by which the image data is input into the personal computer 1 is not limited to the methods described above.

**[0015]** To enable the personal computer 1 to accurately find the hair area when building the image simulating for the hair color, it is preferred that the background upon taking a photograph of the subject using the digital still camera 2 or the background color in a photograph of which the subject is taken, is clearly distinguishable from the hair color of the subject. Ordinarily, the preferred background color is blue.

**[0016]** Next, the input image of the subject is output to and shown on the monitor 4. Fig. 3 shows the image of the subject shown on the monitor 4. This step allows the subject to confirm his or her own input image into the personal computer 1.

**[0017]** In the present invention, the personal computer 1 is given also as a processing means which has a function to distinguish the hair area in the input image of the subject. This function renders unnecessary the

complex operation that the operator of the personal computer uses a mouse to cut out the hair area that comprises the subject of the simulation. This distinguishing function may be enabled in the personal computer 1 by incorporating therein a software program that distinguishes the hair area from the non-hair areas based on such parameters as their brightness and hue, as well as the continuousness of the changes in such parameters or the like.

**[0018]** Where the hair area in the input image of the subject is distinguished by means of the personal computer 1, it may occur that, depending on the hair color or other factors, the actual hair area is not accurately distinguished from the non-hair areas. Therefore, it is desirable that the areas that are not included in the actual hair area but may be identified by the personal computer 1 as a part of the hair area because they are similar to the actual hair area in terms of brightness, hue and the like, and may be subjected to hair color simulation together with the hair area, be designated in advance so that hair color simulation is not carried out for the designated areas. Therefore, it is preferred that the personal computer 1 has a masking function by which certain areas of the input image of the subject are designated as non-simulation areas by the operator of the personal computer.

**[0019]** Conversely, where as a result of reflection during photo exposure or the like, the input image of the subject is whited out in part in the hair area, there is a risk that the personal computer 1 will distinguish any whited-out part of the actual hair area as a non-hair area, and will eliminate that part as a subject of the simulation. To solve this problem, it is preferred that the hair color simulation is performed with respect to a pre-designated area regardless of the results of the hair area determination carried out by the personal computer 1. Therefore, it is preferred that the personal computer 1 has an anti-masking function by which an area of the subject's input image specified by the operator of the personal computer is deemed a hair color simulation area.

**[0020]** As a specific example of this masking step, where the subject has black hair, for example, the personal computer operator specifies such dark areas as the eyes, the nostrils and mouth, clothing or the like, as indicated by the areas enclosed with dashed lines in Fig. 4, and instructs that masking is performed with respect to these areas. The personal computer operator may specify based on the preference of the subject, whether the eyebrows will be simulated together with the hair or not. Where the hair is light brown or blonde, like that of a European people, the personal computer operator specifies on the display screen and performs masking with respect to bright areas such as the face, clothing, etc. In this case as well, eyebrows are handled in the same manner as in the situation in which the hair was dark.

**[0021]** To enable the personal computer 1 to accurately distinguish between hair areas and non-hair areas

in the subject's input image, it is preferred that the personal computer 1 is able to individually set the parameters required to differentiate between hair and non-hair areas in accordance with the image background color, the hair color, etc.

[0022] After the masking step or the anti-masking step is performed, the hair color desired by the subject is specified on the personal computer, and a hair color simulated image is built and displayed on the monitor 4 in which the hair area (more precisely, the hair area found by the personal computer 1, or the corrected areas comprising the hair area and the areas designated by means of the masking or anti-masking) in the image of the subject is changed to the desired hair color.

[0023] For the method of building the simulated image, it is preferred that the color of the hair area in the input image is properly reflected in the image input into the computer, and that a color having a prescribed hue or brightness is overlaid onto it. More specifically, it is preferred that a simulation software program having these functions is incorporated into the personal computer 1.

[0024] Because the simulated image displayed on the monitor 4 represents the initial image of the subject that was incorporated into the personal computer 1, with only the hair area changed to the desired color, the subject can not only confirm the hair color after dyeing by means of this simulated image, but can get a feel for his or her overall appearance after dyeing.

[0025] In the step in which the subject specifies a hair color, it is preferred that an array of simulated images in which the subject's hair is dyed to various representative colors are first displayed on the monitor 4 (see Fig. 5), whereupon the subject may generally indicate the desired hair color from among the simulated images displayed. When this is performed, the subject's preference regarding the permanence of the dye, i.e., the subject preference for a temporary dye or a semi-permanent dye, as well as the subject's prior history of dyeing, the existence of any allergic reactions to chemicals of the subject, etc., may be input to the personal computer 1, if necessary, so that this information is reflected when the dye corresponding to the desired hair color is subsequently output from the personal computer 1.

[0026] It is preferred that after the hair color is roughly specified, an array of simulated images is displayed in which the hair colors are changed by degrees into colors nearby the desired color, so that the subject may once again specify the desired hair color. It is furthermore preferred that the simulated image of the hair color thus specified by the subject is displayed in an enlarged fashion on the monitor 4 (see Fig. 6).

[0027] The specifying of the hair color and the display of the simulated images may be performed repeatedly until the subject is satisfied.

[0028] After the hair color desired by the subject is confirmed, it is preferred that a hair dye suggesting step is conducted in which, based on a database in which

accumulated is information on hair dyes and hair colors before and after dyeing therewith, the personal computer 1 outputs the dye necessary to dye the subject's hair into the color specified by the subject; more specifically the personal computer 1 displays on the monitor 4 the type, color number, product name, etc., of the dye necessary to dye the subject's hair into the color specified by the subject, and thereafter output these information to the printer 5. The contents of these information may be transmitted to the subject via telecommunications network such as the Internet, or may be sent to the subject via direct mail.

[0029] It is furthermore preferred that the hair color simulated image and the actual product image 6 are displayed on the hair dye output screen (see Fig. 7). In this way, the subjects may know with certainty the hair dye needed to achieve the desired hair color for his or her own hair.

## INDUSTRIAL APPLICABILITY

[0030] As described above, because the present invention enables the subjects to know their appearances as the simulated images when their hairs are dyed into the desired colors, the subjects can confirm not only their hair colors after dyeing, but also their entire overall impressions. In addition, by means of the present invention, the hair dyes needed to dye the subject's present colors into the desired colors may be reliably identified as well.

## Claims

### 1. A hair color advice system comprising:

an image memory means into which image data regarding the subject is input and stored;  
a processing means that finds the hair area in the input image of the subject and builds a simulated image in which the color of the hair area is changed to any color; and  
a monitor (display screen) on which the input image of the subject and/or the simulated image are displayed.

2. The hair color advice system according to claim 1, wherein said system includes an image reading means that reads image data regarding the subject.

3. The hair color advice system according to claim 1, wherein said processing means has a masking function by which designated areas within the input image of the subject are deemed hair color non-simulation areas, or an anti-masking function by which designated areas within the input image of the subject are deemed hair color simulation areas.

4. The hair color advice system according to claim 1,  
wherein said processing means outputs the dye  
needed to dye the subject's hair to the color of hair  
in the simulated image, based on a database in  
which accumulated is information on hair dyes and  
hair colors before and after dyeing therewith. 5
5. A hair color advice method comprising:
- a step in which the image data of the subject is 10  
input to the image memory means;  
a step in which the processing means finds the  
hair area in the input image of the subject and  
builds a simulated image in which the color of  
the hair area is changed to any color; and 15  
a step in which the input image of the subject  
and/or the simulated image are displayed on  
the monitor (display screen).
6. The hair color advice method according to claim 5, 20  
wherein after the input image of the subject is dis-  
played on the monitor, but before the simulated im-  
age is built, the masking step to designate hair color  
non-simulation areas within the input image of the  
subject, or the anti-masking step to designate hair 25  
color simulation areas within the input image of the  
subject, is performed.
7. The hair color advice method according to claim 5,  
further comprising a hair dye suggesting step in 30  
which the hair dye needed to dye the subject's hair  
to the color of the hair in the simulated image is out-  
put, based on a database in which accumulated is  
information on hair dyes and hair colors before and  
after dyeing therewith. 35

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Fig. 1

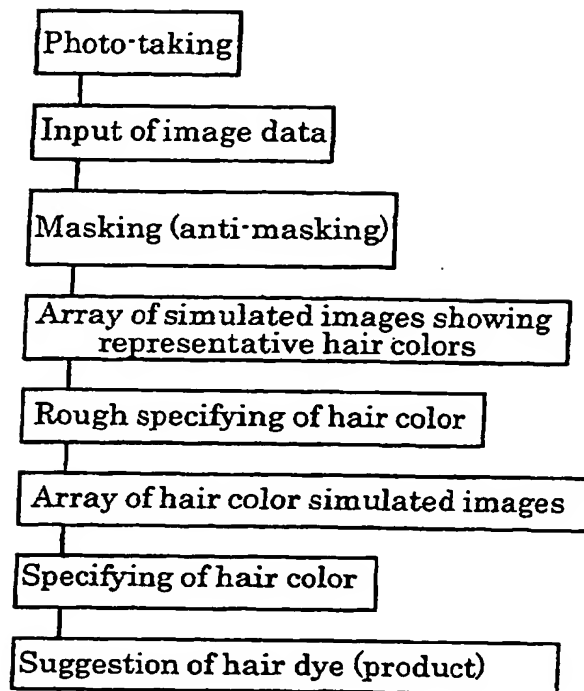


Fig. 2

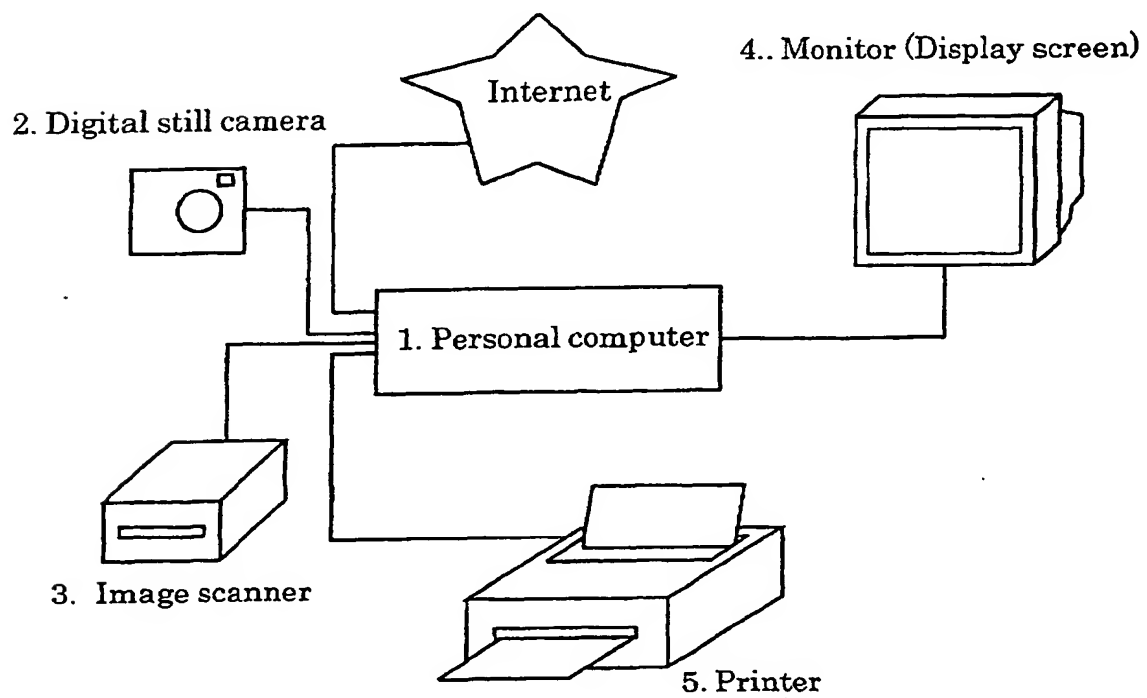


Fig. 3



Fig. 4

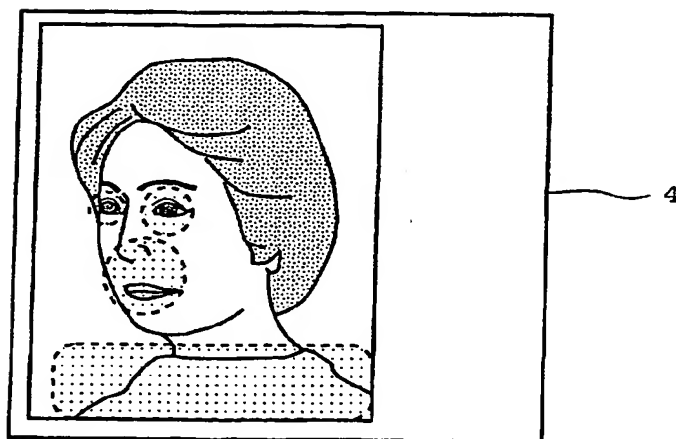


Fig. 5

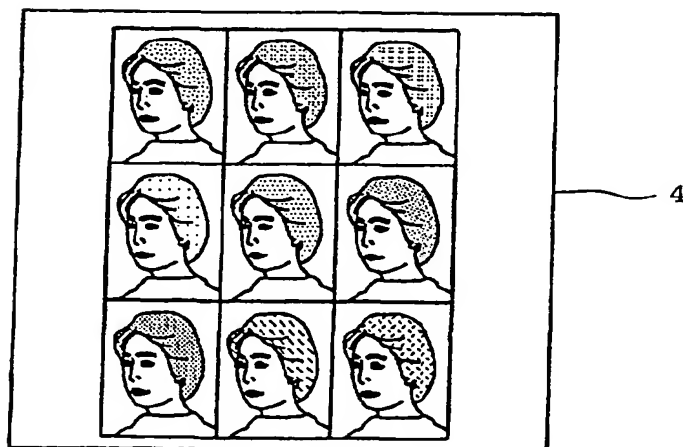




Fig. 6

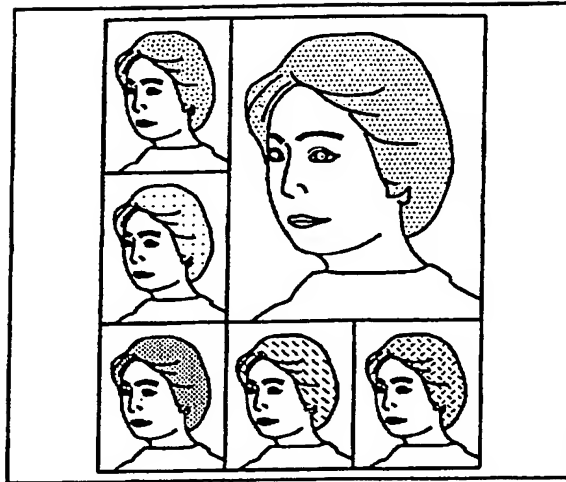
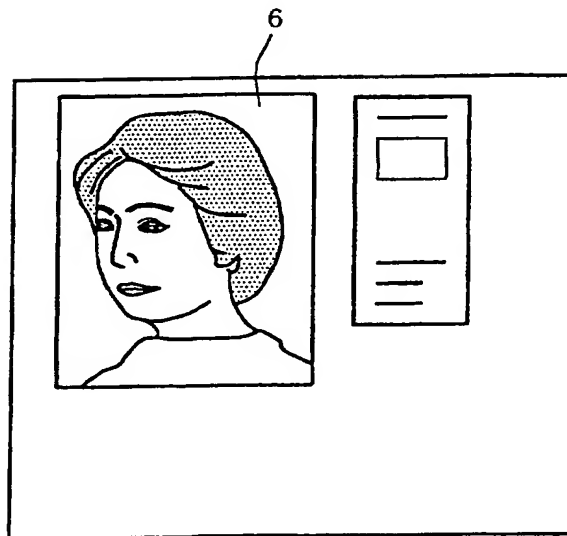


Fig. 7



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP00/07492

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>Int.Cl <sup>7</sup> A45D44/00   |  |  |
|---|--|--|
| According to International Patent Classification (IPC) or to both national classification and IPC   |  |  |
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>Int.Cl <sup>7</sup> A45D44/00, G09B19/00  |  |  |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-2001<br>Kokai Jitsuyo Shinan Koho 1971-2001 Jitsuyo Shinan Toroku Koho 1996-2001   |  |  |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  |  |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>   |  |  |
| Category*   | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No.  |
| Y   | JP, 61-13904, A (Lion Corporation),<br>22 January, 1986 (22.01.86),<br>Full text; all drawings (Family: none)                        | 1-7  |
| Y   | JP, 7-67721, A (ICS K.K.),<br>14 March, 1995 (14.03.95),<br>page 4, Column 6, line 48 to page 5, Column 7, line 12<br>(Family: none) | 3, 6   |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.   |  |  |
| * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier document but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, each combination being obvious to a person skilled in the art<br>"Z" document member of the same patent family |  |  |
| Date of the actual completion of the international search<br>05 February, 2001 (05.02.01)   |  | Date of mailing of the international search report<br>13 February, 2001 (13.02.01) |
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